

[0017] FIGS. 6A and 6B illustrate exploded top and front views of a faceplate, overlay, and touch-sensitive screen, respectively, according to one example.

[0018] FIG. 7 illustrates an exploded top view of a faceplate, overlay, and touch-sensitive screen according to another example.

[0019] FIGS. 8A and 8B illustrate top and perspective views of exemplary systems including a touch-sensitive screen having a virtual keyboard area and display area according to one example.

[0020] FIG. 9 illustrates a top view of an exemplary system including a virtual keyboard area and display area on a touch-sensitive screen according to another example.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Apparatus, systems, and methods are provided for touch-sensitive keyboards capable of displaying multiple keyboard configurations. The following description is presented to allow a person of ordinary skill in the art to make and use various aspects of the inventions. Descriptions of specific materials, techniques, and applications are provided only as examples. Various modifications to the examples described herein will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other examples and applications without departing from the spirit and scope of the inventions.

[0022] According to one example, an input device is provided here where an image of a keyboard (sometimes referred to herein as a “virtual keyboard”) is displayed on a suitable touch-sensitive display device, and where the image of the keyboard, including the configuration of the keyboard and the individual characters, may be changed to represent different keyboard layouts. Typing with a virtual keyboard and touch-sensitive device generally requires touching (or coming in close proximity) to the display surface in an area corresponding to the desired character. Such a touch-sensitive display device, however, generally does not offer the tactile feedback (including either or both of the motion or locational feel of different keys) of conventional physical keyboards. Molded features that assist in locating one’s location on the keyboard and/or providing tactile feedback may be a desirable feature of keyboards because such features allow a user to find keys by touch without looking at the keyboard, and such features provide greater assurance that a key has actually been touched such that the typist can continue typing without waiting for each character to appear on the screen. For example, a typist familiar with a conventional physical keyboard will generally type more slowly or make more errors when using a virtual keyboard displayed without physical keys. Furthermore, virtual keyboards do not offer any resistance to soften the impact of a typist’s fingers against the surface, which may result in fatigue in the typist’s hands, or may require the typist to learn to use a light touch while typing. Virtual keyboards also do not generally allow typists to rest their fingers on the keyboard without causing characters to be entered, as can be done with a physical keyboard.

[0023] Accordingly, the exemplary input device further comprises a keyboard overlay having a plurality of tactile features or extruded areas (e.g., raised features, ridges,

indentations, or other suitable tactile features) arranged in a pattern similar to keys of a conventional keyboard. The overlay is disposed over the touch-sensitive display device to provide a user a tactile feel similar to conventional keyboard devices. In one example, the extruded areas are at least partially transparent to allow a user to view the underlying touch-sensitive display device, which is operable to display characters corresponding to a selected keyboard configuration. In this fashion, the display device may be operable to display multiple keyboard configurations aligned with the extruded areas. When the touch-sensitive device is touched via a user, e.g., depressing or applying pressure to one or more of the extruded areas, the touch-sensitive device determines a location of the touching and associates the location with a character (either by a micro-controller of the input device or a computer associated with the input device).

[0024] In one example, the input device including the touch-sensitive display device and keyboard overlay is used in conjunction with a computer system and display monitor, where the computer system operates with dual display capability (e.g., to display information on both a conventional display device associated with a computer system and the touch-sensitive display device of the input device). In other examples, the touch-sensitive device may be divided into two portions, where a first portion is used to display an image of the keyboard characters associated with the overlay, and a second portion is used to display conventional information. In still other examples, a conventional display may be used in conjunction with a touch-sensitive device divided into at least first and second portions as described, with additional visual and/or functional information displayed in the second portion.

[0025] With reference to FIGS. 1A and 1B, an exploded front and top view of an exemplary input device including a keyboard overlay **100** and touch-sensitive screen **102** is illustrated according to one example. Keyboard overlay **100** includes a set of extruded areas **101** arranged to correspond, e.g., to a layout of a conventional keyboard. Touch-sensitive screen **102** is operable to display an image **103** of a keyboard, in this example shown as a conventional QWERTY keyboard configuration. Overlay **100** is disposed over touch-sensitive screen **102** such that extruded areas **101** align with characters or virtual keys of image **103**. In one example, the position of each extruded area **101** on overlay **100** corresponds to a position of a character or key of image **103** displayed on touch-sensitive screen **102**. In one example, one or more of the extruded areas **101** do not correspond to a key of image **103**. In other examples, multiple extruded areas **101** of overlay **100** correspond to a single key of image **103**.

[0026] In one example, at least a portion of each extruded area **101** is sufficiently transparent to allow the underlying image **103** displayed on touch-sensitive screen **102** to be visible to a user. Each extruded area **101** may be clear or translucent or at least include a portion that is clear or translucent. Overlay **100** and/or extruded areas **101** may include any suitable material to allow a user to view images on touch-sensitive screen **102** therethrough. Further, overlay **100** may include any suitable material to allow a user to depress or apply pressure to an extruded area **101** to register an associated location with touch-sensitive screen **102**.